

What is claimed is:

1. A bent axis hydrostatic unit, comprising,  
a frame,  
5 two yokes pivotally mounted on the frame to pivot on the  
frame in intersecting paths,  
stop means on the yokes and on the frame to limit the  
pivotal movement of the yokes,  
output shafts in the housing,  
10 hydrostatic power units on each of the yokes operatively  
connected to the shafts,  
and a controlled power means for pivoting the yokes and  
supplying pressurized fluid to the hydrostatic power  
units.  
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2. The hydrostatic unit of claim 1 wherein the yokes  
define a neutral position for the cylinder blocks and the  
shafts when in predetermined positions of pivotal movement,  
and wherein the yokes can be pivoted within the following  
20 parameters with "plus" meaning a clockwise direction from a  
neutral position, and "minus" meaning a counterclockwise  
direction from a neutral position: one yoke minus 45° and  
one yoke minus 15°; one yoke plus 45° and one yoke minus  
15°; one yoke plus 45° and one yoke minus 15°; one yoke plus  
25 45° and one yoke plus 45°; one yoke minus 45° and one yoke  
minus 45°; and one yoke 45° and one yoke at 15°.
3. The hydrostatic unit of claim 3 wherein the stops are  
provided on the housing and the yokes to limit the maximum  
30 rotation of each direction away or towards each other as the  
yokes assume positions within the parameters.

4. A bent axis hydrostatic unit,  
a frame,  
two yokes pivotally mounted on the frame,  
hydrostatic units on each yoke each connects to output  
5 shafts on the frame,  
servo pistons fluidly control the positions of each yoke,  
and wherein a control system including a single piece  
housing controls a flow of fluid to the servo pistons  
and to the cylinder blocks to determine the orientation  
10 of the yokes, and rotational power supplied to the  
shafts by the cylinder blocks.

5. The hydrostatic unit of claim 4 wherein a fluid  
manifold to serve as a conduit for high pressure fluid  
15 between the cylinder blocks and which contains fluid valving  
for the hydrostatic unit is rigidly directly secured in  
close intimate proximity to the housing of the control  
system, the manifold being stiff and rigid and comprising a  
main structural element of the hydrostatic unit, with the  
20 close intimate proximity between the manifold and the  
control housing allowing simplified exchange of fluid  
through common fluid ports therebetween.

6. The hydrostatic unit of claim 4 wherein a single piece  
25 fluid control porting plate is secured to the hydrostatic  
unit and single piece control housing to act as a manifold  
to route hydraulic fluid to multiple locations within the  
single piece control housing and to servo valves therein.

30 7. The hydrostatic unit of claim 4 wherein the porting  
plate is directly connected to the single one-piece control  
housing.

8. The hydrostatic unit of claim 1 wherein the yokes each have complimentary surfaces to each other and to the housing to minimize the magnitude of the space occupied by the yokes in some positions of their pivotal movement when the  
5 complimentary surfaces on the housing or on the yokes are in closely spaced relation.

9. A hydrostatic module, comprising:  
a frame;

10 a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;

two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths, wherein each yoke has outer surface including a side wall and  
15 an end wall;

a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same;

a control system for pivoting the yokes; and

20 wherein the yokes each have complimentary surfaces to each other, wherein at least one of the complimentary surfaces is a contoured portion on at least one of the yokes outer surface that permits the end wall of one yoke to be positioned in closely spaced relation to the  
25 side wall of the other yoke without the two yokes contacting one another.

10. The hydromodule of claim 9, wherein the hydrostatic power units are bent axis hydrostatic units.

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11. The hydrostatic module of claim 9, wherein the yokes are of single piece construction.

12. The hydrostatic module of claim 9, wherein the yokes contain integrated fluid passages.

13. The hydrostatic module of claim 9, wherein the yoke containing the contour portion has a yoke centerline that  
5 pivots counter clockwise through an angle  $\theta$  relative to a shaft centerline of that yoke, the other yoke has a yoke centerline that pivots clockwise through an angle  $\alpha$  relative to a shaft centerline of that yoke, and the angle of the contour portion on the end wall of the yoke is equal  
10 to  $\theta + \alpha$  relative to the centerline of the yoke containing the contour portion.

14. The hydrostatic module of claim 9, wherein a contour rib on the frame is contoured to mate with the side wall of the yoke containing the contour portion.

15 15. The hydrostatic module of claim 14, wherein the yoke containing the contour portion has a yoke centerline that pivots counter clockwise through an angle  $\theta$  relative to a shaft centerline of that yoke, the other yoke has a yoke centerline that pivots clockwise through an angle  $\alpha$   
20 relative to a shaft centerline of that yoke, and the angle of the contour rib mating with the side wall is equal to  $90^\circ - \theta$  relative to a surface of the frame perpendicular to the shaft centerline.

25 16. The hydrostatic module of claim 9, wherein stops are provided on the frame and on the yokes to limit the maximum rotation of each direction away or towards each other as the yokes assume positions within the parameters.

17. The hydrostatic module of claim 9, wherein the control system includes a single piece control housing containing servo pistons, the servo pistons adapted to independently establish the orientation of the yokes, and thus the  
5 rotational power supplied to the shafts.

18. The hydrostatic module of claim 9, further comprising a fluid manifold to serve as a conduit for high pressure fluid between the hydrostatic power units and which contains fluid  
10 valving rigidly and directly secured in close intimate proximity to the control housing, the manifold being stiff and rigid and comprising a main structural element of the hydrostatic module, with the close intimate proximity between the manifold and the control housing allowing  
15 simplified exchange of fluid through common fluid ports therebetween.

19. The hydrostatic module of claim 9, further comprising a single piece fluid control porting plate secured to the  
20 control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

20. A hydrostatic module, comprising:  
25 a frame;  
a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;  
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths;  
30 a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same;

a control system for pivoting the yokes; and  
stop means on the yokes and on the frame to limit the  
pivotal movement of the yokes.

5 21. The hydromodule of claim 20, wherein the hydrostatic  
power units are bent axis hydrostatic units.

22. The hydrostatic module of claim 20, wherein the yokes  
are of single piece construction.

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23. The hydrostatic module of claim 20, wherein the yokes  
contain integrated fluid passages.

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24. The hydrostatic module of claim 20, wherein the yokes  
define a neutral position for the cylinder blocks and the  
shafts when in predetermined positions of pivotal movement,  
and wherein the stops permit the yokes to be pivoted within  
the following parameters with "plus" meaning a clockwise  
direction from a neutral position, and "minus" meaning a  
counterclockwise direction from a neutral position: one  
yoke minus 45° and one yoke minus 15°; one yoke plus 45° and  
one yoke minus 15°; one yoke plus 45° and one yoke minus  
15°; one yoke plus 45° and one yoke plus 45°; one yoke minus  
45° and one yoke minus 45°; and one yoke 45° and one yoke at  
25 15°.

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25. The hydrostatic module of claim 24, wherein the stops  
are provided on the frame and the yokes to limit the maximum  
rotation of each direction away or towards each other as the  
30 yokes assume positions within the parameters.

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26. The hydrostatic module of claim 20, wherein the control system includes a single piece control housing containing servo pistons, the servo pistons adapted to independently establish the orientation of the yokes, and thus the rotational power supplied to the shafts.

27. The hydrostatic module of claim 20, further comprising a fluid manifold to serve as a conduit for high pressure fluid between the hydrostatic power units and which contains fluid valving rigidly and directly secured in close intimate proximity to the control housing, the manifold being stiff and rigid and comprising a main structural element of the hydrostatic module, with the close intimate proximity between the manifold and the control housing allowing simplified exchange of fluid through common fluid ports therebetween.

28. The hydrostatic module of claim 20, further comprising a single piece fluid control porting plate secured to the control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

29. A hydrostatic module, comprising:  
a frame;  
a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;  
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths;  
a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same; and

a control system for pivoting the yokes, wherein the control  
system includes a single piece control housing  
containing servo pistons, the servo pistons adapted to  
independently determine the orientation of the yokes,  
5 and thus the rotational power supplied to the shafts.

30. The hydrostatic module of claim 29 wherein a fluid  
manifold to serve as a conduit for high pressure fluid  
between the hydrostatic power units and which contains fluid  
10 valving rigidly and directly secured in close intimate  
proximity to the control housing, the manifold being stiff  
and rigid and comprising a main structural element of the  
hydrostatic module, with the close intimate proximity  
between the manifold and the control housing allowing  
15 simplified exchange of fluid through common fluid ports  
therebetween.

31. The hydrostatic module of claim 29, wherein a single  
piece fluid control porting plate is secured to the control  
20 housing to route hydraulic fluid to multiple locations  
within the control housing and to servo valves therein.

32. The hydrostatic module of claim 31, wherein the porting  
plate is directly connected to the single one-piece control  
25 housing.

33. A hydrostatic module, comprising:  
a frame;  
a pair of spaced shafts rotatably supported by the frame and  
30 directed outwardly from the frame;  
two yokes pivotally mounted on the frame to pivot with  
respect to the frame in intersecting paths;



a hydrostatic power unit carried by each yoke, and each  
hydrostatic power unit being operatively connected to  
one of the shafts to rotate the same;  
a control system for pivoting the yokes, wherein the control  
5 system includes a control housing containing servo  
pistons, the servo pistons adapted to determine the  
orientation of the yokes, and thus the rotational power  
supplied to the shafts; and  
a fluid manifold to serve as a conduit for high pressure  
10 fluid between the hydrostatic power units and which  
contains fluid valving rigidly and directly secured in  
close intimate proximity to the control housing, the  
manifold being stiff and rigid and comprising a main  
structural element of the hydrostatic module, with the  
15 close intimate proximity between the manifold and the  
control housing allowing simplified exchange of fluid  
through common fluid ports therebetween.

34. The hydrostatic module of claim 33, wherein a single  
20 piece fluid control porting plate is secured to the control  
housing to route hydraulic fluid to multiple locations  
within the control housing and to servo valves therein.

35. A hydrostatic module, comprising:

25 a frame;  
a pair of spaced shafts rotatably supported by the frame and  
directed outwardly from the frame;  
two yokes pivotally mounted on the frame to pivot with  
respect to the frame in intersecting paths;  
30 a hydrostatic power unit carried by each yoke, and each  
hydrostatic power unit being operatively connected to  
one of the shafts to rotate the same;

a control system for pivoting the yokes, wherein the control system includes a control housing containing servo pistons, the servo pistons adapted to determine the orientation of the yokes, and thus the rotational power supplied to the shafts; and

a single piece fluid control porting plate secured to the control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

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